L 31879-66 EWT(m)/ETC(f)/EWP(e)/EWP(t)/ETI IJP(c) AT/WH/GD/WW/JW/JD/JG

ACC NR: AT6013562 (A) SOURCE CODE: UR/0000/65/000/000/0243/0249

AUTHOR: Kosolapova, T. Ya.; Fedorus, V. B.

60
B+1

ORG: Institute of Materials Science Problems, AN UkrSSR (Institut problem materialovedeniya AN UkrSSR)

TITLE: Interaction between the carbides and the oxides of transition metals

SOURCE: AN UkrSSR. Institut problem materialovedeniya. Vysokotemperaturnyye neorganicheskiye soyedineniya (High temperature inorganic compounds). Kiev, Naukova dumka, 1965, 243-249

TOPIC TAGS: transition metal, oxide, inorganic oxide, transition element, carbide, heat of formation

ABSTRACT: The interaction between oxides and carbides of La, Ti, Zr, Ga, V, Nb, and Cr in vacuo at 1000°-2000°C was investigated. The briquettes of the oxide and carbide mixtures were heated at 10^{-3} mm Hg from 1000°C to the melting temperature of the reaction products when they were lower than 2000°C, and from 1000°C to 2000°C when the melting temperature of the reaction products were greater than 2000°C. It was found that the interaction between oxides and carbides depends upon the atomic number of the transition elements of the respective oxides and carbides. The interaction increased in the order of group IV, V, and VI of the periodic system. The dependence of the free

Card 1/2

energy change for reaction between oxides and carbides upon temperature is shown in figure 1. The difference of the heat of formation of carbides and oxides of Zr, Nb, Mo, Ti, V, and Cr is graphed. Orig. art. has: 2 figures, 5 tables.

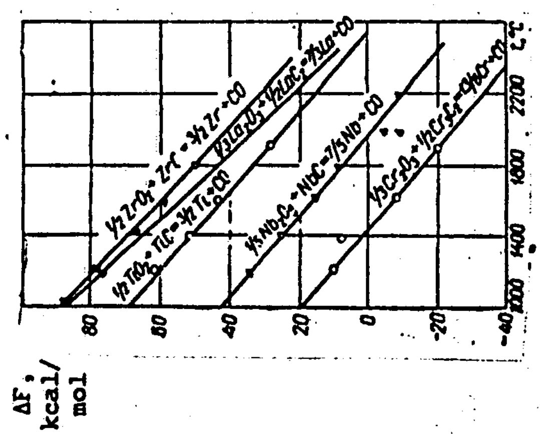

Fig. 1.

SUB CODE: 11, 07/ SUBM DATE: 03Jul65/ ORIG REF: 006

L 09314-67 EWT(m)/EWP(t)/ETI IJP(c) WH/JD

ACC NR: AP6029828 (A) SOURCE CODE: UR/0363/66/002/008/1516/1520

23

22

AUTHOR: Kosolapova, T. Ya; Fodorus, V. B.; Kuz'ma, Yu. B.

ORG: Institute of Materials Science Problems, Academy of Sciences, UkrSSR (Institut problem materialovedeniya Akademii nauk UkrSSR)

TITLE: Reactions of carbides of transition metals with their oxides

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 8, 1966, 1516-1520

TOPIC TAGS: transition metal oxide, carbide

ABSTRACT: The reactions of oxides of titanium, zirconium, hafnium, vanadium, niobium and chromium with their carbides were studied in the range of 1000-2000°C (at 100°C intervals) at 10^{-3} mm Hg by using chemical and x-ray analyses. The formation of intermediate products was studied manometrically in certain reactions. In the TiO_2-TiC and ZrO_2-ZrC systems at 1000-2000°C, the reaction proceeds up to the formation of MC_xO_{1-x} oxycarbides. No reaction is observed in the HfO_2-HfC system in this temperature range. Carbides of group V metals, VC and NbC, react with the corresponding oxides to form the metals via stages of formation of lower oxides and carbides. The formation of chromium by the reaction of Cr_3C_2 with Cr_2O_3 is already observed at 1200°C. A rise in temperature leads to an increase in the yield of pure chromium, reaching 96% in the vicinity of the melting point of chromium. It is concluded that the difference in the nature of the reactions of group IV, V and VI transition metal

Card 1/2 UDC: 546.261+541.45

L 09314-67

ACC NR: AP6029828

oxides with carbides is due to the difference in the electronic structure of the metal atoms forming these oxides and carbides. Authors thank G. V. Samsonov for useful remarks and suggestions during the discussion of this work. Orig. art. has: 6 tables.

SUB CODE: 07/11/ SUBM DATE: 11Oct65/ ORIG REF: 011

Card 2/2

L 09313-67 EWT(m)/EWP(t)/ETI IJP(c) WH/WW/JD/JG

ACC NR: AP6029829 (A) SOURCE CODE: UR/0363/66/002/008/1521/1523

58

AUTHOR: Kosolapova, T. Ya.; Fedorus, V. B.; Kuz'ma, Yu. B.; Kotlyar, Ye. Yo. 37

ORG: Institute of Materials Science Problems, Academy of Sciences, UkrSSR (Institut problem materialovedeniya Akademii nauk UkrSSR)

TITLE: Nature of the reaction of zirconium dioxide with titanium, niobium and chromium carbides

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 2, no. 8, 1966, 1521-1523

TOPIC TAGS: zirconium compound, titanium compound, niobium compound, chromium carbide, carbide

ABSTRACT: The reaction of ZrO_2 with TiC, NbC, or Cr_3C_2 was studied at 1000-2000°C at 10^{-2} mm Hg by means of phase chemical and x-ray analyses. The reaction in the ZrO_2-TiC system begins at 1300°C, and at 1900-2000°C results in the formation of a phase identified as a complex oxycarbide of the approximate composition $(Zr_{0.3}Ti_{0.7})(C_{0.56}O_{0.44})$ with lattice constant a = 4.43 Å. The reaction in the ZrO_2-NbC system begins at 1500°C. At about 1900-2000°C, a complex carbide of the type $(Nb_xZr_{1-x})C$ is formed in addition to a complex oxide of the type $(Nb_yZr_{1-y})O_2$. A chemical phase analysis based on the different solubilities of zirconium dioxide and niobium carbide in mixtures of H_2O_2 and citric acid was elaborated. The reaction of ZrO_2 with Cr_3C_2 results at 1300°C in the reduction of ZrO_2 to ZrC and in the formation of the lower

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L 09313-67
ACC NR: AP6029829

chromium carbide Cr_7C_3. It is concluded that the difference in the nature of the reaction of ZrO_2 with carbides of group IV, V and VI metals is due to the difference in the electronic structure of the metal atoms forming the carbides. Authors thank G. V. Samsonov for useful remarks and suggestions during the course of this work. Orig. art. has: 3 tables.

SUB CODE: 07,11/ SUBM DATE: 11Oct65/ ORIG REF: 002

Card 2/2

FEDOROVS, Z. P.

USSR/Nuclear Physics - Installations and Instruments. Methods of Measurement and Research. C-2

Abs Jour : Ref Zhur - Fizika, No 4, 1957, 8520

Author : Gabovich, M.D., Fedorus, Z.P.

Inst :

Title : Source of Protons with Thermal Dissociation of Hydrogen Molecules.

Orig Pub : Ukr. fiz. zh., 1956, 1, No 2, 158-169.

Abstract : It is shown that it is possible to increase considerably the yield of atomary ions (up to 85%) in ionic sources by using the thermal dissociation of H_2 in the discharge chamber of the source. In the source developed in this investigation, the discharge takes place in a metal chamber heated to 2500° K and results from the energy liberated during the discharge process. It is shown that increasing the yield of atomary ions causes the thermal dissociation of the H_2 molecules.

Card 1/1

Inst. Physics AS UkrSSR

FEDORUS, Z. P.

GABOVICH, M.D.[Gabovych, M.D.]; NEMETS, O.F.; FEDORUS, Z.P.

On the utilization of a high-current pulse discharge in proton sources [In Ukrainian with summary in English]. Ukr.fiz.zhur. 3 no.1:104-111 Ja-F '58. (MIRA 11:4)

1. Institut fiziki AN URSR.
(Protons) (Electric discharges through gases)

9.3150,24.2120

77847
SOV/57-30-3-13/15

AUTHORS: Gabovich, M. D., Bartnovskiy, O. A., Fedorus, Z. P.

TITLE: Sag of the Potential on the Axis of a Discharge at Electron Oscillation in a Magnetic Field

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1960, Vol 30, Nr 3, pp 345-350 (USSR)

ABSTRACT: Kistemaker and Sneider (Physica, 19, 950, 1953) showed experimentally that in a discharge with electron oscillations in magnetic field potential on the axis of discharge may be considerably smaller than potential of anode. In the present paper the authors investigate causes for such a potential sag and examine conditions favoring effect. Figure 1 shows the diagram of experimental setup and measuring circuitry. In addition to cathode K and anode A, there are two reflectors O_1 and O_2 at the potential of the cathode of negative with respect to it. The cathode was either of tantalum, indirectly heated by bombardment of electrons originating on F or a directly-heated tungsten cathode. The

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APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00041272(

Sag of the Potential on the Axis of a Discharge at Electron Oscillation in a Magnetic Field

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whole 35 mm length of the system was in an uniform longitudinal magnetic field H variable 0-4,000 oersted. The behavior of anode current I_a, probe current I_p (at -80 v with respect to anode) and noise intensity in probe curcuit I_n as functions of magnetic field are presented in Fig. 2. For $I_H = 1$, H $\gtrsim$ 500 oersted. U_a was 300 v with respect to the cathode. The authors prove irregularities of the I_a curve are unambiguously related to noise intensity. They explain these irregularities by formation of a fundamental discharge column caused by axial oscillations of primary electrons in the raising magnetic field. At a certain optimum value of I_H the field starts substantially preventing plasma electrons from reaching the anode and produces a potential "groove." Its radial electrical field, in turn, facilitates motion of electrons toward the anode which was hampered by the presence of

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S.g of the Potential on the Axis of a Discharge at Electron Oscillation in a Magnetic Field

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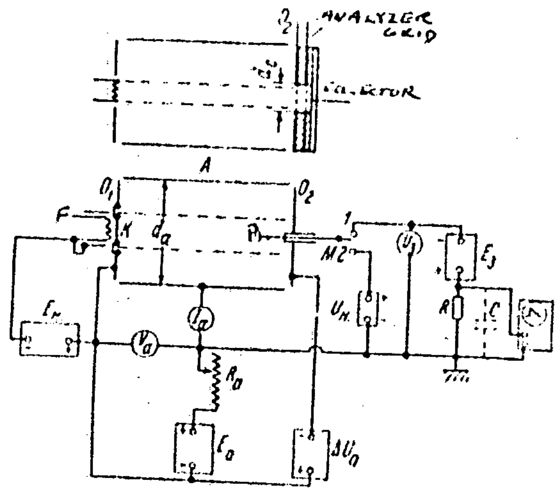
SOV/57-30-3-13/15



Card 3/11 Fig. 1.

Sag of the Potential on the Axis of a Discharge at Electron Oscillation in a Magnetic Field

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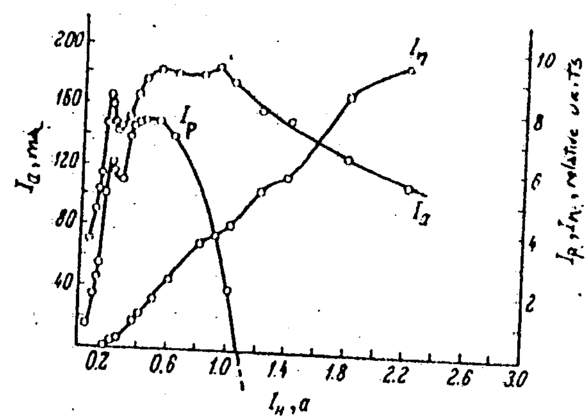

Card 4/11 Fig. 2.

magnetic field. Further increase of H produces an unstable discharge, causing the mentioned irregularities and noises. The probe current changes sign because of an increasing number of primary electrons reaching it and a decrease of potential of paraxial plasma. Further increase of the magnetic field finally takes over and decreases the anode current until discharge is apparently completely halted. To measure potential inside the plasma the authors developed a special thermal probe consisting of a tungsten disc 1 mm diam and 0.05 mm thick on a tungsten wire inside an insulating quartz tube. By a relay M (see Fig. 1) probe P is raised to a potential U_H during a time interval τ_1. The electron current bombarding the probe can heat it sufficiently to produce an appreciable electron emission. During the second half of the cycle τ_2 probe is at potential U_p and, if the heating effect is now lower than previously, emission will decrease. Now, in the case of U_p being lower than plasma potential, decrease of emission is accompanied by a decrease of probe current while in $U_p >$ U plasma current changes sign and remains constant in time. The authors changed probe potential 20 times per second, observed current pattern on an oscilloscope, and registered plasma potential from those readings of the U_p voltmeter at which the decaying current pattern on the oscilloscope screen switched to the rectangular one. Results for measured potential U_a and plasma potential on discharge axis U_n are shown in Fig. 6 as a function of magnetization current I_H and diam of the anode. Analysis of results showed $\Delta U = U_a - U_n$ is a linear function of the square of the anode diam:

Sag of the Potential on the Axis of a Discharge at Electron Oscillation in a Magnetic Field

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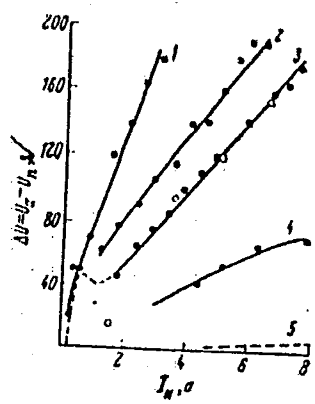

Fig. 6. (1) d_a = 4.0 cm (2) d_a = 3.4 cm (3) d_a = 2.7 cm (4) d_a = 1.8 cm (5) d_a = 1.0 cm

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Sag of the Potential on the Axis of a Discharge at Electron Oscillation in a Magnetic Field

77847
SOV/57-30-3-13/15

The authors discovered that radial potential drop is almost completely located outside the axial plasma of diam equal to diam of the cathode. They note, however, all measurements mentioned above were done in the presence of a perturbation caused by the presence of the probe. They circumvent this objectionable situation by developing a special setup consisting of a grid across an ϕ = 8 mm opening on the reflector O_2 followed by another analyzer grid and a collector. Distribution of potentials is shown on the right in Fig. 8. The authors assumed there would be an appreciable ion current on the collector only when potential of analyzer grid U_c is equal or smaller than potential of plasma U_n. Using these values they constructed the curves in Fig. 8 for an anode 2.7 cm diam. Extrapolated potential values in the manner indicated in Fig. 8 then yielded points marked by hollow circles in Fig. 6. The agreement between the two methods is apparently very good.

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Sag of the Potential on the Axis of a Discharge at Electron Oscillation in a Magnetic Field

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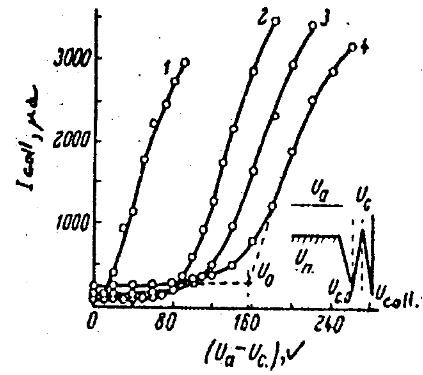

Fig. 8. (1) $I_H = 1.5$ a (2) $I_H = 3.5$ a (3) $I_H = 5.0$ a (4) $I_H = 6.5$ a

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Sag of the Potential on the Axis of a Discharge at Electron Oscillation in a Magnetic Field

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SOV/57-30-3-13/15

The authors finally did some theoretical calculations starting from the equation of radial electron current density

$$j_- = -D\frac{dn_-}{dr} + \frac{De}{kT}n_-\frac{dU}{dr} \qquad (1)$$

and the continuity equation

$$\frac{dj_-}{dr} + \frac{j_-}{r} = \beta n_-. \qquad (2)$$

Assuming n_- to be constant, they obtained a theoretical expression for ΔU in volts

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Sag of the Potential on the Axis of a Discharge at Electron Oscillation in a Magnetic Field

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$$\Delta U(v) \approx 10^{-2} \cdot H(\text{oe})\, d_a^2. \quad (5)$$

which for H = 1,500 oersted and d_a = 4 cm yields $\Delta U \approx$ 240 v versus the experimentally measured value 180 v. The authors note relationship U = $f(H, d_a^2)$ as well as value ΔU are in fair agreement with the experiment. The strong radial fields up to 100 v/cm are connected to a decrease of electron diffusion towards the anode. There are 8 figures; and 6 references, 3 Soviet, 1 Dutch, 1 German, and 1 U.S. The U.S. reference is: D. Bchm. The Characteristics of Electrical Discharges in Magnetic Fields. N. Y. 1949.

ASSOCIATION: None given

SUBMITTED: April 18, 1959

Card 11/11

FEDORYAK, G.M., inzh.; KAPLUN, Ye.Ya.

Preliminary cementation of water-bearing rock in vertical shaft sinking in a Krivoy Rog Basin mine. Shakht. stroi. 8 no.9:27-28 S '64. (MIRA 17:12)

1. Trest Krivbassshakhtoprokhodka (for Fedoryak). 2. Shakhtoprokhodcheskoye upravleniye No.1 tresta Krivbassshakhtoprokhodka (for Kaplun).

FEDORYAKIN, B.F.

Accelerating the hardening of asbestos cement by the preliminary hydration of portland cement. Trudy IUzhgiprotsementa no.6:73-86 '64.

Developing a method of preparing asbestos cement products using previously hydrated portland cement. Ibid:87-99

(MIRA 17:12)

STRELKOV, M.I., kand. tekhn. nauk; FEDORYAKIN, B.F., inzh.

Intensification of the hydration process in hardening asbestos-cement products. Stroi. mat. 11 no. 12:24-26 D '65. (MIRA 18:12)

TRUSOV, I. A.; FEDORYCHEV, A. M.

Drilling inclined holes with cable drilling rigs. Razved. i okh. nedr 28 no.5:53-54 My '62. (MIRA 15:10)

1. Gidroproyekt.

(Boring machinery)

SOV/111-58-12-32/38

AUTHOR: Fedorychev, A.V., Engineer

TITLE: Re-Equipping Instrument Tables ST-35 and STA (Pereoborudovaniye apparatnykh stolov ST-35 i STA)

PERIODICAL: Vestnik svyazi, 1958, Nr 12, pp 35-36 (USSR)

ABSTRACT: The present arrangement of the equipment on instrument tables ST-35 and STA has certain deficiencies. For example, the method of connecting motor and line circuits of the start-stop telegraph apparatus caused frequent failures due to broken wires. A group of mechanics of the Gor'kiy Central Telegraph Office suggested several modifications which will eliminate these deficiencies.
There are 3 diagrams.

ASSOCIATION: Gor'kovskiy tsentral'nyy telegraf (Gor'kiy Central Telegraph Office)

Card 1/1

FEDORUS, I.

"Faulty Calculations in the Production of Canned Goods," Mias. ind. SSSR, No.2, 1952

FEDORUS, I.

Eliminate inconsistencies in the "Basic stipulations." Mias. ind. SSSR 28 no.3:32-33 '57. (MLRA 10:6)

1. Orskiy myasnoy kombinat.
(Meat industry)

FEDORYAK, V.Ye., starshiy nauchnyy sotrudnik

Acantholyda stellata in Kazakhstan. Zashch. rast. ot vred. i bol. 8 no.10:20-21 O '63.

(MIRA 17:6)

1. Kazakhskiy nauchno-issledovatel'skiy institut lesnogo khozyaystva.

GEGELASHVILI, V.K.; GORCHAKOV, M.M.; FEDORYUK, G.M.; SVIDZINSKAYA, I.V.

Tank furnace for continuous operation direct heating in the manufacture of S-87-1 glass products. Stek. i ker. 20 no.12: 27-29 D '63. (MIRA 17:1)

CHAPLYA..., P.; ..., I.; ...DORYUK, I.

Workers' gifts to the 22d Congress of the CPSU. Avt.transp. 39 no.10:4-5 O '61. (MIRA 14:10)

1. Nachal'nik Poltavskoy gruzovoy avtostantsii. (Efficiency, Industrial)

USSR/Cultivated Plants - Potatoes. Vegetables. Melons. M

Abs Jour : Ref Zhur Biol., No 12, 1958, 53632

Author : Fedoryukov, M.I.
Inst : ---
Title : Experiment in Obtaining High Yields of Vegetables.

Orig Pub : S. kh. Povolzh'ya, 1956, No 4, 42-44

Abstract : On growing vegetable on the flood-land soils of Penzenskaya Oblast'.

Card 1/1

FEDORYUK, M. V. (Moscow).

An error in the "Collection of geometrical problems for construction" of I.I.Aleksandrov. Mat.v shkole no.6:75-76 N-D '53. (MLRA 6:12)
(Geometry--Problems, exercises, etc.) (Aleksandrov, I.I.)

16.4100

69773
S/155/59/000/02/014/036

16

AUTHOR: Fedoryuk, M.V.

TITLE: On the Approximation of Continuous Functions by Polynomials on Smooth Curves in the n-dimensional Complex Space

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1959, No. 2, pp. 78-82

TEXT: The author proves the theorems:

Theorem 1 : Let Γ^1 be a unidimensional open curve of the class C^2 in the complex R^n . Let $z_j = \varphi_j(t)$, $t \in J = [0,1]$, $\varphi_n'(t) \neq 0$ be the parameter representation of Γ^1 . Then every function continuous on Γ^1 can be approximated by polynomials in $z_1, z_2, \ldots, z_n$.

Theorem 2 : Let S^1 be a closed unidimensional curve of the class C^2 in R^n with the equations $z_j = \varphi_j(t)$, $t \in L = \{t : |t| = 1\}$, $\varphi_n'(t) \neq 0$. Then every function continuous on S^1 can either be approximated by polynomials in $z_1, z_2, \ldots, z_n$, or S^1 lies on a unidimensional complex analytic manifold with finitely many singularities and bounds a domain D. In the last case every

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69773

On the Approximation of Continuous Functions by Polynomials on Smooth Curves in the n-dimensional Complex Space S/155/59/000/02/014/036

function continuous on S^1 which is approximable by polynomials in $z_1, z_2, \dots, z_n$ is analytically continuable ; the function obtained is continuous in $D \cup S^1$.
These theorems are moreover formulated in terms of the normed rings of functions.
The author mentions D.A. Anosov.
There are 5 references: 1 Soviet and 4 American.

ASSOCIATION: Moskovskiy gosudarstvennyy univeristet imeni M.V. Lomonosova (Moscow State University imeni M.V. Lomonosov)

SUBMITTED: March 13, 1959

X

Card 2/2

3

~~16(1)~~ 16.4600

AUTHOR: Fedoryuk, M.V. (Moscow) SOV/39-49-4-3/6

TITLE: Non-Homogeneous Generalized Functions of two Variables

PERIODICAL: Matematicheskiy sbornik, 1959, Vol 49, Nr 4, pp 431-446 (USSR)

ABSTRACT: The paper starts from I.M. Gel'fand and Z.Ya. Shapiro [Ref 1].
Theorem 1 : Let

(1) $P(x,y) = \sum\limits_{k,l=o}^{\infty} a_{kl}x^k y^l$, $P(0,0) = 0$, (1) is assumed

to converge in the neighborhood U of the initial point and to be positive in U for $(x,y) \neq (0,0)$. Assume that $\varphi(x,y)$ is of class C^{∞} and = 0 outside of U. Then $I(\lambda) = \iint P^{\lambda}(x,y)\varphi(x,y)dx\,dy$ is a meromorphic function of λ , the poles of which lie on finitely many arithmetic sequendes

(2) $\lambda_k = -\frac{k+m}{2n}$,

4

Card 1/3

where k,m,n are natural numbers. All the poles are simple except the points of intersection of the arithmetic sequences in which double poles are possible.

Theorem 2: Let $I(\lambda) = \iint\limits_{x>0,\,y>0} x^{a\lambda+b} y^{c\lambda+d} P^{\lambda}(x,y)\varphi(x,y)\,dx\,dy$

where $P(x,y)>0$ for $x>0$, $y>0$ and can be expanded into a series (1); a,b,c,d are natural numbers. Then $I(\lambda)$ is meromorphic in λ, the poles lie on finitely many sequences $\lambda_k = -\frac{k+m}{n}$, whereby equally double poles can occur only in the points of intersection of the series.

Theorem 3: Let $P(x,y)$ be a polynomial. Then $I(\lambda) = \iint\limits_{P>0} P^{\lambda}(x,y)\varphi(x,y)\,dx\,dy$ is a meromorphic function of λ, the poles of which lie on finitely many sequences (2') $\lambda_k =$

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Non-Homogeneous Generalized Functions of two Variables SOV/39-49-4-3/6

$= - \frac{k+m}{n}$ and can be double at most ib the points of inter-section of the sequences ; k,m,n are natural numbers.

There are 2 references, 1 of which is Soviet, and 1 American.

SUBMITTED: February 14, 1958

Card 3/3

80047
S/020/60/132/01/15/064

16.3500
AUTHOR: Fedoryuk, M.V.

TITLE: The Asymptotic Behavior of Green's Function in the Cauchy Problem for a System Correct According to Petrovskiy and Involving Two Variables $t \to +0$, $x \to \infty$

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 132, No. 1, pp. 63-66

TEXT: At first the author considers the equation of n-th order with constant coefficients

$$(1) \qquad \frac{\partial u}{\partial t} = P\left(i\frac{\partial}{\partial x}\right)u$$

$$(2) \qquad u\big|_{t=0} = u_0(x)$$

and calls it 1) parabolic according to Petrovskiy if $P(s) = a_0 s^n + \ldots$, $\mathrm{Re}\, a_0 < 0$, n-pair number 2) properly parabolic according to Shilov if $P(s) = a_0 s^n + \ldots + a_{n-p} s^p + \ldots$, $\mathrm{Re}\, a_0 = \mathrm{Re}\, a_1 = \ldots = \mathrm{Re}\, a_{n-p-1} = 0$, $\mathrm{Re}\, a_{n-p} < 0$, p-even, $n > p \geqslant 2$ and 3) properly correct according to Pe-

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80047

The Asymptotic Behavior of Green's Function in the Cauchy Problem for a System Correct According to Petrovskiy and Involving Two Variables $t \to +0$, $x \to \infty$ S/020/60/132/01/15/064

trovskiy if $P(s) = i\,Q(s)$, where $Q(s)$ is a polynomial with real coefficients. In a large table the author gives partially known classes of correctness for all three cases, and the asymptotic of the Green's function. It is stated that the Green's function $G(x,t)$ decreases differently quick on $x > 0$ and $x < 0$.
Then the author investigates the Cauchy problem

$$(5) \qquad P\left(\frac{\partial}{\partial t},\ i\frac{\partial}{\partial x}\right) = 0$$

$$(6) \qquad u\Big|_{t=0} = \frac{\partial u}{\partial t}\Big|_{t=0} = \dots = \frac{\partial^{n-2}u}{\partial t^{n-2}}\Big|_{t=0} = 0\ ,\quad \frac{\partial^{n-1}u}{\partial t^{n-1}}\Big|_{t=0} = \delta(x)$$

with the aid of a lemma of V.M. Borok (Ref. 3). It is stated that the Green's function for $t \to +0$, $x \to \infty$ consists of n summands. The summands correspond to the different characteristic roots of the system and can be obtained from the above mentioned table by multiplication with certain factors.

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80047

The Asymptotic Behavior of Green's Function S/020/60/132/01/15/064
in the Cauchy Problem for a System Correct According to Petrovskiy and
Involving Two Variables $t \to +0$, $x \to \infty$

The author thanks Ya.I. Zhitomirskiy for giving the theme.
There are 4 Soviet references.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova (Moscow State University imeni M.V. Lomonosov)

PRESENTED: December 1, 1959, by I.G. Petrovskiy, Academician

SUBMITTED: November 27, 1959

Card 3/3

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S/020/60/134/005/028/035XX
C111/C111

16,3500

AUTHOR: Fedoryuk, M.V.

TITLE: The Asymptotic Behavior of Green's Functions 16 for Equations Involving Many Variables and Correct According to Petrovskiy

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol.134, No.5, pp.1027-1029

TEXT: Let $x = (x_1, \dots, x_k) = \varrho(\alpha_1, \dots, \alpha_k)$, $\varrho > 0$, $\sum\limits_{j=1}^{k} \alpha_j^2 = 1$, $\alpha = (\alpha_1, \dots, \alpha_k)$, $k \geqslant 2$; α_j, x_j - real. Let G be the solution of the Cauchy problem 16

(1) $$\frac{\partial u}{\partial t} = P\left(i \frac{\partial}{\partial x}\right) u$$

(2) $$u\big|_{t=0} = \delta(x),$$

where $P\left(i \frac{\partial}{\partial x}\right)$ is a differential operator with constant coefficients. (1) is correct according to Petrovskiy if Re $P(s) < C$ for all real s. Let $P(s) = P_n(s) + P_{n-1}(s) + \dots + P_o$ be the decomposition of $P(s)$ into a sum of homogeneous polynomials, where the degree of $P_j(s)$ equals j. Let (1) be correct according to Petrovskiy. Then it holds:

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The Asymptotic Behavior of Green's Functions for Equations Involving Many Variables and Correct According to Petrovskiy

1^o. (1) is parabolic according to Petrovskiy if Re $P_n(s)<0$ for $\sum_{j=1}^{k} \sigma_j^2 = 1$, $s_j = \sigma_j + i\tau_j$.

2^o. (1) is properly parabolic according to Shilov if Re $P(\sigma) < C_1 - C_2 |\sigma|^h$, $h<n$, $C_2 > 0$.

3^o. (1) is properly correct according to Petrovskiy in all other cases.

The author considers systems

1^o

2': Systems 2^o for which $P_n(s)$, $P_{n-1}(s), \ldots, P_{p+1}(s)$ have purely imaginary coefficients, $P_n(s)$ is not degenerated and Re $P_p(s)<0$ for $\sum_{j=1}^{k} \sigma_j^2 = 1$, $p>0$.

3': Systems 3^o for which $P_n(s)$, $P_{n-1}(s), \ldots, P_1(s)$ have purely imaginary coefficients and $P_n(s)$ is not degenerated.

Besides let

(8) $\frac{\partial P_n}{\partial s_j} = i\alpha_j$, $j=1,\ldots,k$

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The Asymptotic Behavior of Green's Functions for Equations Involving Many Variables and Correct According to Petrovskiy

have no multiple roots.

Theorem 1: For an equation parabolic according to Petrovskiy it holds for $\varrho \to +\infty$, $t \to +0$

$$G(x,t) \sim \sum_{j=1}^{m} \exp\left[\frac{\varrho^{\frac{n}{n-1}}}{t^{\frac{1}{n-1}}} \sum_{l=0}^{\infty} c_{lj}(\alpha)\left(\frac{t}{\varrho}\right)^{-\frac{1}{n-1}}\right] A_j(\alpha,\varrho,t), \tag{3}$$

where

$$A_j(\alpha,\varrho,t) = \varrho^{-\frac{k(n-2)}{2(n-1)}} t^{-\frac{k}{2(n-1)}} B_j(\alpha) \tag{4}$$

$$\mathrm{Re}\ c_{oj}(\alpha) < a < 0, \quad m < (n-1)^k. \tag{5}$$

Theorem 2: For equations of the type 2' and 3', where $iP_n(s)$ is definite, the asymptotic behavior of $G(x,t)$ for $\varrho \to +\infty$, $t \to +0$ is given by (3),(4), where the case 3'

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The Asymptotic Behavior of Green's Functions for Equations Involving Many Variables and Correct According to Petrovskiy

(6) $c_{lj}(\alpha)$ is purely imaginary, $j=1,\dots,m$, $l=0,1,\dots$

and in the case 2' it holds

(7) $$\mathrm{Re}\, c_{oj}(\alpha) = \mathrm{Re}\, c_{1j}(\alpha) = \dots = \mathrm{Re}\, c_{p+1,j}(\alpha) = 0,\ \mathrm{Re}\, c_{pj}(\alpha) < 0,$$
$$j=1,\dots,m.$$

Theorem 3: Let $P_n(s)\cdot i$ be indefinite, let (1) be of the type 2'. Then the real sphere Ω: $\sum_{j=1}^{k} \alpha_k^2 = 1$ consists of two parts Ω_I and Ω_{II}; Ω_{II} is the set of the points $\alpha \in \Omega$ for which (8) has real solutions. For $\varsigma \to +\infty$, $t \to +0$ the asymptotic behavior of $G(x,t)$ for $\alpha \in \Omega_I$ is given by (3),(4),(5) and for $\alpha \in \Omega_{II}$ by (3),(4),(6).

Theorem 4: Let $P_n(s)i$ be indefinite, let (1) be of the type 3'. Then it holds

(9) $$Q_q\left(\frac{\partial}{\partial x}\right) G(x,t) = (\Delta - 1)^{\left[\frac{q+k}{2}\right]+2} G_o(x,t)$$

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$$R_r\left(\frac{\partial}{\partial t}\right) G(x,t) = (\Delta - 1)^{\left[\frac{rn+k}{2}\right]+2} G'_0(x,t), \tag{10}$$

where $\Delta = \partial^2/\partial x_1{}^2 + \ldots + \partial^2/\partial x_k{}^2$, $Q_q(\partial/\partial x)$ and $R_r(\partial/\partial t)$ are differential operators of the orders q and r with constant coefficients and G_0, G'_0 are continuous functions. The asymptotic behavior of G_0 and G'_0 for $\rho \to +\infty$, $t \to +0$ in the case $\alpha \in \Omega_{II}$ is given by (3), (6), where

$$A_j^q(\alpha,\rho,t) = \rho^{-\frac{k(n-2)}{2(n-1)} - \frac{2\left[\frac{k+q}{2}\right]+4-q}{n-1}} t^{-\frac{k}{2(n-1)} + \frac{2\left[\frac{k+q}{2}\right]4-q}{n-1}} B_j^{(q)}(\alpha), \tag{11}$$

$$A'^{(r)}_r(\alpha,\rho,t) = \rho^{-\frac{k(n-2)}{2(n-1)} - \frac{2\left[\frac{k+nr}{2}\right]+4-nr}{n-1}} t^{-\frac{k}{2(n-1)} + \frac{2\left[\frac{k+nr}{2}\right]+4-nr}{n-1}} B'^{(r)}_j(\alpha), \tag{12}$$

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The Asymptotic Behavior of Green's Functions for Equations Involving Many Variables and Correct According to Petrovskiy

while in the case $\alpha \in \Omega_{II}$ for G_o and G'_o there hold the estimations

(13) $$|G_o| < C(\alpha)\exp\left[-C_1(\alpha)\varsigma^{\frac{n}{n-1}} / t^{\frac{1}{n-1}}\right],$$

$$|G'_o| < C'(\alpha)\exp\left[-C'_1(\alpha)\varsigma^{\frac{n}{n-1}} / t^{\frac{1}{n-1}}\right].$$

Theorem 5: Let the assumptions of theorem 4 be satisfied. Besides let on every ray $s_j = \sigma^o_j \tau$, $0 \leqslant \tau < \infty$, σ^o_j real for $|s| > a(\sigma)$ hold the inequation

(14) $$|P_n(s)| > c(\sigma)\tau^2.$$

Then for $t > 0$, $G(x,t)$ is an entire function in x and an infinitely often differentiable function of t. The asymptotic behavior of $G(x,t)$ for $\varsigma \to +\infty$, $t \to +0$ in the case $\alpha \in \Omega_I$ is given by (3), (4), (5) and in the case $\alpha \in \Omega_{II}$

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The Asymptotic Behavior of Green's Functions for Equations Involving Many Variables and Correct According to Petrovskiy

by (3), (4), (6).
The author mentions S.L.Sobolev and thanks I.M.Gel'fand.
There are 4 Soviet references.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni M.V.Lomonosova (Moscow State University imeni M.V.Lomonosov)

PRESENTED: May 21, 1960, by I.G.Petrovskiy, Academician

SUBMITTED: February 25, 1960

Card 7/7

FEDORYUK, M.V.

Asympvotic of the Green function for equations involving many variables and correct according to Petrovskii. Dokl. AN SSSR 134 no.5:1027-1029 O '60. (MIRA 13:10)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova. Predstavleno akademikom I.G.Petrovskiy.
(Differential equations, Partial)
(Potential, Theory of)

S/658/62/000/009/013/013
A059/A126

AUTHOR: Fedoryuk, M.V.

TITLE: Generalization of the Herglotz-Petrovskiy formulas for the case of many-valued roots

SOURCE: Moscow. Fiziko-tekhnicheskiy institut. Trudy. no. 9, 1962. Issledovaniya po mekhanike i prikladnoy matematike. 161 - 171

TEXT: The equation $\Delta\left(\frac{\partial}{\partial t}, \frac{\partial}{\partial x_1}\right) K(t, x_1) = 0$ (1)

is considered which is assumed to be hyperbolic, and thus the polynomial $\Delta(\tau, \xi_1)$ for any real ξ_1 different from zero has n real roots of τ. If $n(t_1, x_1, \omega_1)$ is the solution of Cauchy's problem:

$$u\Big|_{t=0} = \dots = \frac{\partial^{n-2}u}{\partial t^{n-2}}\Big|_{t=0} = 0, \quad \frac{\partial^{n-1}u}{\partial t^{n-1}}\Big|_{t=0} = \begin{cases} \delta^{(p-1)}\left(\sum \omega_1 x_1\right), & p \text{ is uneven} \\ \left(\sum \omega_1 x_1\right)^{-p}, & p \text{ is even} \end{cases}. \tag{4}$$

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Generalization of the Herglotz-Petrovskiy S/658/62/000/009/013/013
A059/A126

The equation $$u(t, x_i, \omega_i) = \sum_f c_j f(\sum \omega_i x_i + v_j t) \qquad (37)$$

represents the solution of the problem (4) for any ω_i. The formulas

$$\varphi_{ik}(\xi_i) = \frac{\left[\left(\sum \xi_i \frac{\partial}{\partial \xi_i}\right)^{k_i+1} H - (k_i+1)(n-k_i)\left(\sum \xi_i \frac{\partial}{\partial \xi_i}\right)^{k_i+1} H\right]^{k_i-k^0} \sqrt{\sum \xi_i^2} \cos\theta}{\left[\left(\sum \xi_i \frac{\partial}{\partial \xi_i}\right)^{k_i} H\right]^{k_i-k^0+1}} \qquad (35)$$

and

$$K(t, x_i) = -2c_p \sum_{i=1}^{s} \int_{H_i} \left(\sum_{k=1}^{k_i} c_{ikmp} t^{k-1} f_{k-1,m,p}(x_i, \xi_i, t) \varphi_{ik}(\xi_i)\right) d\sigma, \qquad (36)$$

if p is even and $m \geq 0$ were found to be correct. I.G. Petrovskiy, I.M. Gel'fand, and Z.Ya. Shapiro are mentioned. Thanks are due to Z.Ya. Shapiro for assistance.

Card 2/2

FEDORYUK, M.V. (Moskva)

Stationary phase method for multidimensional integrals. Zhur. vych. mat. i mat. fiz. 2 no.1:145-150 Ja-F '62. (MIRA 15:3)
(Calculus, Integral) (Differential equations, Partial)

FEDORYUK, M.V.

Generalization of Petrovskii-Herglotz formulas for the case of multiple roots. Trudy MFTI no.9:161-171 '62. (MIRA 16:5)
(Differential equations)

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00041272(

FEDORYUK, M.V. (Moskva)

Asymptotic behavior of Green's functions at $t \to +0$, $x \to \infty$ for Petrovskii-correct equations with constant coefficients, and the classes of correctness of solution of the Cauchy problem. Mat. sbor. 62 no.4:397-468 D '63. (MIRA 17:4)

ACCESSION NR: AP4042755 S/0208/64/004/004/0671/0682

AUTHOR: Fedoryuk, M. V. (Moscow)

TITLE: Stationary phase method. Close saddle points in the multidimensional case

SOURCE: Zhurnal vy*chislitel'noy matematiki i matematicheskoy fiziki, v. 4, no. 4, 1964, 671-682

TOPIC TAGS: stationary phase, saddle point, electromagnetic wave, caustic, asymptotic, close stationary point

ABSTRACT: Let $x = (x_1, \ldots, x_n)$, $dx = dx_1, \ldots, dx_n$, $f(x,\alpha)$ be a real function and D a region in E^n. The author is interested in finding asymptotics as $k \to +\infty$ for integrals of the form

$$\Phi(k, \alpha) = \int_D e^{ikf(x,\alpha)} \varphi(x, \alpha)\, dx, \qquad (1)$$

which arises in the theory of diffraction of short electromagnetic waves in the study of the field close to a caustic. The function $f(x,\alpha)$ for small α has two close stationary points which merge for $\alpha = 0$. It is required to find asymptotics $\Phi(k,\alpha)$ as $k \to +\infty$ uniform in α, $|\alpha| < \delta$. This has been done

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ACCESSION NR: AP4042755

for the one-dimensional case, and the author now proves the corresponding formulas for the n-dimensional case. He computes the impact of a pair of close stationary points and also considers the case of complex α. Orig. art. has: 59 formulas.

ASSOCIATION: none

SUBMITTED: 04Jul63

ENCL: 00

SUB CODE: MA

NO REF SOV: 003

OTHER: 002

Card 2/2

FEDORYUK, M.V.

Asymptotic behavior of the discrete spectrum of the operator $-w''(x)+\lambda^2 p(x)w(x)$. Dokl. AN SSSR 158 no.3:540-542 S '64.
(MIRA 17:10)

1. Moskovskiy fiziko-tekhnicheskiy institut. Predstavleno adademikom A.A.Dorodnitsynym.

L 58787-65 EWT(d)/T IJP(c)

ACCESSION NR: AP5015219 UR/0376/65/000/005/0631/0646

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B

AUTHOR: Fedoryuk, M. V.

TITLE: Unidemensional problem on dispersion in a quasiclassical approximation

SOURCE: Differentsial'nyye uravneniya, no. 5, 1965, 631-646

TOPIC TAGS: asymptotic property, canonical transformation, set theory, real function, quantum mechanics, Schroedinger equation

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ABSTRACT: Three aspects of dispersion and reflection phenomena are studied. The problem areas are: 1) the problem of reflection from a barrier of infinite width, 2) the problem of passage through a barrier of infinite width and 3) the problem of barrier reflection. The Schroedinger equation is stated as

$$-\frac{\hbar^2}{2m}\varphi''(x)+(V(x)-E)\varphi(x)=0,$$

and rewritten in the form $\varphi''(x)-\lambda^2 q(x)\varphi(x)=0,$

where the potential function $q(x)$ and a major parameter λ are given by

$$V(x)-E=q(x),\ \hbar^{-1}\sqrt{2m}=\lambda.$$

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ACCESSION NR: AP5015219

All three problems are described and set up for solution by a single method involved with prolonging the function $\phi(x)$ into the complex plane of z. The assumption is made that $q(x)$ has a finite number of null points and, denoting x_j as the null points of $q(x)$, $1 \leq j \leq k$, and $x_j < x_{j+1}$, the author makes the definitions

$$C_- = x_1\sqrt{|q_-|} + \int_{-\infty}^{x_1} \left(\sqrt{|q(x)|} - \sqrt{|q_-|}\right) dx, \quad A_- = e^{iC_-},$$

$$C_+ = -x_k\sqrt{|q_+|} + \int_{x_k}^{+\infty} \left(\sqrt{|q(x)|} - \sqrt{|q_+|}\right) dx, \quad A_+ = e^{iC_+},$$

$$c_l = \int_{x_{2l-1}}^{x_{2l}} \sqrt{|q(x)|}\, dx, \quad a_l = \int_{x_{2l}}^{x_{2l+1}} \sqrt{|q(x)|}\, dx.$$

A formula is given for finding asymptotes for the first two cases (reflection and dispersion through an infinitely wide barrier). The formula is written as

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L 58787-65

ACCESSION NR: AP5015219 $s_{11} = \frac{1}{t}\, i\,(A_+A_-)^{-1} s_{11}^0,\ s_{11} = A_- A_+^{-1} s_{11}^0,$

$$s_{11}^0 = 2^{m-1} \exp\left(i\lambda \sum_{l=1}^{m} c_l\right)\left(\prod_{l=1}^{m-1} \cos \lambda t_l + O(\lambda^{-1})\right).$$

and is subject to the restraints: q(z) is an integral function, $q(z) \in Q_1$, $q(x)$ has 2m null points, $\lambda \to +\infty$ and $m > 1$. The development of a full treatment of the problem cases includes a review of Schroedinger's equations and the terminology involved. The review includes definitions and brief discussions of Stokes' lines, domains of Stokes' lines, elementary fundamental solution systems, and classes of potential function. Several lemmas dealing with system topology are stated and proved. The techniques of constructing elementary fundamental solution systems and transition matrices are presented, including the selection of canonical domains. Orig. art. has: 69 equations.

ASSOCIATION: Moskovskiy fiziko-tekhnicheskiy institut (Moscow Physico-Technical Institute)

SUBMITTED: 08Dec64 ENCL: 00 SUB CODE: MA, GP

NO REF SOV: 000 OTHER: 000

Card 3/3 dm

FEDORYUK, M.V.

Topology of Stokes lines in equations of the second order. Izv. AN SSSR. Ser. mat. 29 no.3:645-656 '65. (MIRA 18:6)

FEDORYUK, M.V. (Moskva)

Asymptotic behavior of the discrete spectrum of the operation $w''(x) - \lambda^2 p(x) w(x)$. Mat. sbor. 68 no.1:81-110 S '65. (MIRA 18:9)

L 1426-66 EWT(1)

ACCESSION NR: AP5013747 UR/0020/65/162/002/0287/0289

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B

AUTHOR: Fedoryuk, M. V. 44,55

TITLE: Asymptotics of a one-dimensional scattering problem 21,44,55

SOURCE: AN SSSR. Doklady, v. 162, no. 2, 1965, 287-289

TOPIC TAGS: ordinary differential equation, approximation method, asymptotic stability

ABSTRACT: The equation studied is $y''(x) - \lambda^2 q(x)y(x) = 0$, where q is a real-valued function under the following conditions:

$$\int^{\pm\infty} |\sqrt{q(x)} - \sqrt{q_\pm}||dx| < \infty, \quad \int_{-\infty}^{\infty} |\delta(x)||dx| < \infty,$$
$$\delta(x) = |q'^2(x)| + |q''(x)|.$$

For solutions of (1) when $x \to +\infty$, we have: $y_{1,2}^+(x) \sim |q_+|^{-1/4} \exp(\pm i\lambda \sqrt{|q_+|}x)$,

and for $x \to -\infty$,

$$\begin{pmatrix} y_1^+ \\ y_2^+ \end{pmatrix} = S(\lambda) \begin{pmatrix} y_1^- \\ y_2^- \end{pmatrix};$$

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The quantities

are called respectively the *passage* and *reflection* coefficients. Asymptotics are found for $S(\lambda)$ and $D_4(\lambda)$ when $\lambda \to +\infty$. "I express my deep gratitude to M. A. Evgrafov for a number of valuable suggestions and constant attention to my work." Orig. art. has: 17 formulas.

ASSOCIATION: Moskovskiy fiziko-tekhnicheskiy institut (Moscow Physicotechnical Institute) 44,55

SUBMITTED: 23Nov64 ENCL: 00 SUB CODE: MA

NO REF SOV: 008 OTHER: 000

Card 2/2

FEDORYUK, M.V.

One-dimensional scattering problem in quasi-classical approximation. Part 2. Dif. urav. 1 no.11:1525-1536 N '65, (MIRA 18:12)

1. Moskovskiy fiziko-tekhnicheskiy institut.

L 13914-66 EWT(d) IJP(c)

ACC NR: AP5028819 SOURCE CODE: UR/0039/65/068/001/0081/0110

AUTHOR: Fedoryuk, M. V. (Moscow)

ORG: none

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B

TITLE: Asymptotics of the discrete spectrum of a second order ordinary differential operator

16,44,55

SOURCE: Matematicheskiy sbornik, v. 68, no. 1, 1965, 81-110

TOPIC TAGS: differential equation, eigenvalue, differential operator

ABSTRACT: The author considers

$$w''(x) - \lambda^2 p(x) w(x) = 0, \qquad (1)$$

$$w(+\infty, \lambda) = w(-\infty, \lambda) = 0 \qquad (2)$$

where p(z) is an entire function. After giving basic definitions, he first finds asymptotics of the eigenvalues for real p(x) (first with two simple real zeros, then with an arbitrary number of simple zeros, then where p(x) is even with simple real zeros). A rigorous proof of the Landau-Lefschetz formula is given. Then consideration is made of the case p(x) complex, finding necessary and sufficient conditions under which (1), (2) have an infinite discrete spectrum where p(x) is a polynomial, computing the asymptotics of the discrete spectrum. Some results are

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ACC NR: AP5028819

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obtained for entire p(z). Asymptotics of eigenfunctions on the real axis are found, and for μ the spectral parameter extends to certain results on

$$w''(x) - \lambda^2(p(x) - \mu)w(x) = 0. \qquad (3)$$

The technique is similar to that of G. D. Birkhoff (Quantum mechanics and asymptotic series, Bull. Amer. Math. Soc. 39 (1933), 681-700). Orig. art. has: 1 figure and 87 formulas.

SUB CODE: 12/ SUBM DATE: 30Mar64/ SOV REF: 005/ OTH REF: 002

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FEDORYUK, M.V.

Asymptotic behavior of solutions to ordinary linear differential equations of the n-th order. Dokl. AN SSSR 165 no.4:777-779 D '65. (MIRA 18:12)

1. Submitted April 12, 1965.

L 16929-66 EWT(d)/T/EWP(1) IJP(c)

ACC NR: AP5028766 SOURCE CODE: UR/0376/65/001/011/1525/1536

35

B

AUTHOR: Fedoryuk, M. V.

ORG: Moscow Physico-Technical Institute (Moskovskiy fiziko-tekhnicheskiy institut)

76,44,55

TITLE: One-dimensional problem on dispersion in a quasiclassical approximation. Part 2

SOURCE: Differentsial'nyye uravneniya, v. 1, no. 11, 1965, 1525-1536

TOPIC TAGS: quantum mechanics, integral function, approximation

ABSTRACT: The discussion of three aspects of dispersion and reflection phenomena studied in part I is continued with special stress on the following two problems: 1) the passage through a barrier of infinite width and 2) the problem of sub-barrier reflection. On the basis of the assumption that the conditions of theorem 3.2 of part I hold and $m = 2$, the case of almost complete penetration is studied first. Several resonance conditions are investigated by means of various theorems and lemmas. In particular, for $m > 2$ a set of $m-1$ resonance values λ_{nj}

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ACC NR: AP5028766

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are encountered such that

$$D_{+}(\lambda_{nl}) = \exp\left(-2\lambda \sum_{l=1}^{m-1} c_l\right) O(e^{2\lambda c_0}).$$

The second problem is analyzed for the case of q(z) an integral function, $q(z) \in Q_1$. A domain Γ^{+} is defined which contains two or more zeros of q(z). The meromorphic nature of the function q(z) is investigated, and additional conditions are imposed on it. It is shown that for $q(z) \in Q_0$, Γ^{+} contains not only null points but first order poles of the function q(z) as well. This result is proved by means of a theorem. Orig. art. has: 58 equations.

SUB CODE: 12,20/ SUBM DATE: 08Dec65/ SOV REF: 011 OTH REF: 002

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L 18004-66 EWT(d)/T IJP(c)

ACC NR: AP6007171 SOURCE CODE: UR/0042/66/021/001/0003/0050

AUTHOR: Yevgrafov, M. A.; Fedoryuk, M. V.

ORG: none

TITLE: Asymptotics of solutions of the equation $w''(z)-p(z,\lambda)w(z) = 0$ in the complex plane z at $\lambda \longrightarrow \infty$

SOURCE: Uspekhi matematicheskikh nauk, v. 21, no. 1, 1966, 3-50

TOPIC TAGS: ordinary differential equation, second order differential equation, asymptotic solution, solution analytic continuation

ABSTRACT: The analytic continuation is analyzed of known asymptotic solutions of the following equation (which is important in physics and quantum mechanics):

$$w''(z)-\lambda^2 p(z) w(z)=0, \qquad (1)$$

where λ is a real parameter and p(z) is an entire function in a complex plane z. The main problem considered consists in deriving the algorithm for the analytic continuation of asymptotic solutions of (1) from the domain of the z plane, in which the solution is known, into the entire z plane. The problem of such analytic continuation is divided into two problems: 1) Topological problem: to determine in which domains of the z-plane the known asymptotic formulas are applicable. 2) Algebraic problem:

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ACC NR: AP6007171

To construct, in various domains D_i of the z-plane, the fundamental system of solutions whose asymptotics at $\lambda \to \infty$ are known and to establish the relation between the various fundamental systems of solutions. If such relations are established, then, knowing the asymptotics of the solution in one domain, it may be analytically continued into an entire z-plane. In the solution of a topological problem, it is established that the asymptotic of solutions is applicable in domains bounded by Stokes lines with the exception of small neighborhoods around the turning points. The structure of Stokes lines is analyzed and the class of applicability domains is clearly defined. In the solution of the second problem, the transition from one fundamental system of solutions of equation (1) to another system described by the so-called transfer matrix is considered. The question of selecting the most convenient of the elementary fundamental systems of solutions is analyzed. Four elementary transfer matrices corresponding to the four basic types of transfers from one fundamental system of solutions to another are calculated. It is established that every transfer matrix in question can be represented as a product of elementary matrices corresponding to the four basic types of transfers. Two examples show how transfer matrices are applied in the solution of particular problems. Asymptotic formulas are obtained for the solutions of the more general equation

$$w''(z)-p(z,\lambda)w(z)=0. \qquad (2)$$

in the case when $p(z,\lambda)$ is a polynomial in z having no multiple zeros. Orig. art. has: 88 formulas and 2 figures. [LK]

SUB CODE: 12/ SUBM DATE: 02Apr64/ ORIG REF: 013/ OTH REF: 021/ ATD PRESS: 4213

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L 29097-66 EWT(d) IJP(c)

ACC NR: AP6019398 SOURCE CODE: UR/0020/65/165/004/0777/0779

AUTHOR: Fedoryuk, M. V.

17

B

ORG: none

TITLE: Asymptotic behavior of solutions to ordinary, linear, n-th order differential equations

SOURCE: AN SSSR. Doklady, v. 165, no. 4, 1965, 777-779

TOPIC TAGS: asymptotic behavior, ordinary differential equation, linear differential equation

ABSTRACT: The article considers the asymptotic behavior of solutions to ordinary, linear, n-th order differential equations. Several theorems are formulated, including one that offers a wide new class of closed symmetric operators L_0 having any possible defective number m. This paper was presented by Academician I. G. Petrovskiy on 12 April 1965. Orig. art. has: 6 formulas. [JPRS]

SUB CODE: 12 / SUBM DATE: 28Mar65 / OTH REF: 005

Card 1/1 cc

FEDOSEEV, V. A. German CA: 47:3081

U55R with B. A. MANAKIN and Z. M. DOMENTIANOVA

Univ. Odessa

"Mutual coagulation of aerosols."

Kolloid. Zhur. 14, 470-7 (1952)

FEDOSENKO, A., inzhener (Minsk).

Repairing footwear in separate operations. Prom.koop.no.3:9-10 Mr '57. (MLRA 10:4)

1. Gorpromsovet.
(Boots and shoes--Repairing)

VAFINA, N., master muzhskogo verkhnego plat'ya; NOVRUZOV, M.; CHEREPNINA, M.; ZANTBERG, L. (Kiyev); YEGOROV, Yu. (Pererva); FEDOSENKO, A. (Minsk); LYUTSKO, A.; SMIRNYAGIN, V., instruktor; NIKOLAYEV, I.; KHARAK, G.

Our labor gifts to the congress of the builders of communism. Mest.prom.i khud.promys. 2 no.10:2-5 O '61. (MIRA 14:11)

1. Shveynyy kombinat, g. Ivanova (for Vafina). 2. Sekretar' partbyuro kombinata nadomnogo truda, Baku (for Novruzov). 3. Sekretar' obkoma profsoyuza rabochikh mestnoy promyshlennosti i kommunal'nogo khozyaystva, Rostov-na-Donu (for Cherepnina). 4. Glavnyy inzhener raypromkombinata, g. Slonim Belorusskoy SSR (for Lyutsko). 5. Respublikanskiy komitet profsoyuza rabochikh mestnoy promyshlennosti i kommunal'nogo khozyaystva, Kishinev (for Smirnyagin). 6. Sekretar' oblastnogo komiteta profsoyuza rabochikh mestnoy promyshlennosti i kommunal'nogo khozyaystva, Pskov (for Nikolayev). 7. Nachal'nik otdela truda i zarplaty Ministerstva mestnogo khozyaystva Estonskoy SSR, Tallin (for Kharak).

(Efficiency, Industrial)

FEDOSENKO, A.K.

Ornithological finds in Krasnoyarsk Territory. Biul.MOIP. Otd. biol. 63 no.4:137-138 Jl-Ag '58 (MIRA 11:11)
(KRASNOYARSK TERRITORY--BIRDS)

VASIL'YEV, F.; GORSHKOV, N., narodnyy sud'ya (g.Suzdal', Vladimirskoy oblasti); KOLPAKOV, G. (s.Staraya Mayna, Ul'yanovskoy oblasti); FEDOSENKO, A. (g.Minsk)

Readers ask questions, tell their experiences and make suggestions. Mest. prom. i khud. promysl 2 no.6:25 Je '61. (MIRA 14:7)

1. Starshiy mekhanik fabriki No.59, g. Moskva (for Vasil'yev). (Manufactures)

FEDOSENKO, A.K.; GAVRILOV, E.I.

Effect of the peculiarities of spring on the behavior of birds.
Biul. MOIP. Otd. biol. 67 no.1:121-122 Ja-F '62. (MIRA 15:3)
(BIRDS--BEHAVIOR)

USHAKOVA, G.V.; FEDOSENKO, A.K.

Occurrence of the tick Ixodes stromi Fil., 1957 in the Trans-Ili Ala-Tau. Trudy Inst. zool. AN Kazakh. SSR 19:240-241 '63.

(MIRA 16:9)

(Trans-Ili Ala-Tau—Ticks)

FEDOSENKO, A.K.; BERNSHTEYN, A.D.

Materials on the reproduction of the Tien Shan red-backed forest mouse Clethrionomys frater Thos in the Trans-Ili Ala-Tau. Trudy Inst. zool. AN Kazakh SSR 20:153-163 '63. (MIRA 17:2)

BUSALAYEVA, N.N.; FEDOSENKO, A.K.

Fleas parasitizing on lesser mammals in the high mountains of the Trans-Ili Alatau. Trudy Inst. zool. AN Kazakh. SSR 22:177-183 '64. (MIRA 17:12)

FEDOSENKO, A.K.

Characteristics of murine rodents in the Trans-Ili Alatau Highland. Trudy Inst. zool. AN Kazakh. SSR. 23:75-134 '64. (MIRA 17:11)

FEDOSENKO, A.K.; SMIRINA, E.M.; BERNSHTEYN, A.D.

Materials on the reproduction of Alticola argentatus leucurus Sev. in the Trans-Ili Alatau. Biul. MOIP Otd. biol. 70 no. 6: 21-29 N-D '65 (MIRA 19:1)

YEREMENKO, A.S., kandidat tekhnicheskikh nauk; PECHUK, V.I., kandidat tekhnicheskikh nauk; FEDOSENKO, A.P., inzhener.

Measurement of parameters in a stream of steam. Trudy Inst.tepl.URSR no.12: 54-58 '55.
(Steam turbines) (Pressure (Physics)--Measurement) (MIRA 9:7)

SOV/123-59-15-61948

Translation from: Referativnyy zhurnal. Mashinostroyeniye, 1959, Nr 15, p 400 (USSR)

AUTHORS: Yeremenko, A.S., Fedosenko, A.P.

TITLE: Losses in Turbine Guide Bladings

PERIODICAL: Sb. tr. In-t teploenerg. AN UkrSSR, 1958, Nr 14, pp 167 - 173

ABSTRACT: Results are stated of investigations of aerodynamic characteristics of bladings. For blades of a relative length of 1.7 within the limits of variations of the angle of incidence between 60 - 100° the efficiency varied only insignificantly $\eta_{\kappa} \approx 85\%$, at an optimum pitch of 0.804. For blades with a relative length of 0.396 with an angle of 60 - 100° the value of η_{κ} amounted to 92 - 94%.

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PHASE I BOOK EXPLOITATION SOV/3898
SOV/31-M-14

Akademiya nauk UkrSSR. Institut teploenergetiki

Teploobmen i gidrodinamika (Heat Transfer and Hydrodynamics) Kiyev, 1958. 190 p. (Series: Its: Sbornik trudov, no. 14) 2,000 copies printed.

Eds. of Publishing House: Ya.L. Kaplan and N.M. Labinova; Tech. Ed.: M.I. Yefimova; Editorial Board: I.T. Shvets (Resp. Ed.), Academician, Academy of Sciences UkrSSR; G.M. Shchegolev (Deputy Resp. Ed.), Candidate of Technical Sciences; N.M. Kondak (Resp. Secretary), Candidate of Technical Sciences; V.I. Tolubinskiy, Corresponding Member, Academy of Sciences UkrSSR; I.I. Chernobyl'skiy, Doctor of Technical Sciences; M.M. Mazarchuk, Candidate of Technical Sciences; P.I. Lavrov, Candidate of Technical Sciences; P.D. Shvetnov, Professor; and N.M. Pyatyshkin, Candidate of Technical Sciences.

PURPOSE: This collection of articles is intended for scientific workers and technical personnel in the fields of heat transfer and hydrodynamics.

COVERAGE: This collection of 18 articles deals with experimental and theoretical studies of problems in heat transfer and hydrodynamics as they affect steam and gas turbines and heat-transfer devices. The results of theoretical investigations of heat transfer in turbine components and in elements of heat-utilizing apparatus are described, and new calculation methods are suggested. Several problems of the thermodynamics and aerodynamics of steam and gas turbines are discussed. References follow each article.

Balitskiy, S.A. Investigation of the Amount of Heat Given off When Aqueous Solutions of Lithium Bromide and Lithium Chloride are Boiled Under Vacuum 97

The paper deals with a study of the heat-transfer coefficient for aqueous solutions of LiBr and LiCl under conditions of boiling under vacuum. The effects of the concentration of the solution, the ambient pressure, and other parameters are determined.

Birozub, I.Ye. Approximate Method of Calculating Velocity and Temperature Fields for the Case of Laminar Flow of a Compressible Fluid With Heat-Transfer Around an Object 106

Pol'skiy, N.I. On the Possibility of Reducing the Differential Equations of a Laminar Boundary Layer to Ordinary Differential Equations 117

Shvetsov, P.D., and V.I. Pechuk. Aerodynamic Investigations of the System of Intercylinder Exchange of Steam in Powerful Steam Turbines 122

The authors present the results of model tests to study intercylinder exchange in steam turbines. The study is primarily concerned with the hydraulic losses encountered. Recommendations for reducing the internal drag of the system are presented.

Gashenan, I.L. Effect of Manufacturing Defects on End Losses in the Guide Vanes of Welded Turbine Diaphragms 134

Gorbatyy, Yu.P., A.Sh. Dorfman, and M.I. Saykovskiy. Effect of Relativity and Pitch on the Magnitude of the Profile Losses in Cascades 148

Saykovskiy, M.I., and A.Sh. Dorfman. Criteria for Estimating the Efficiency of Intake Nozzles 159

Yeremenko, A.S., and A.P. Fedosenko. Losses in Turbine Guide Vanes of the Cascade Type 167

Yeremenko, A.S., and A.P. Fedosenko. Investigation of the Losses in Turbine Blade Cascades 174

The above two papers deal with an investigation of the losses in turbine guide vanes of the cascade type. The efficiency of the cascade is determined as a function of the inflow angle, blade-incidence angle, blade pitch, and other parameters.

Shvets, I.T., V.M. Sidun, and L.I. Romanyuk (Deceased). Experimental Investigation of the Heat Conductivity of Soils Used in Greenhouses and Hotbeds 186

AVAILABLE: Library of Congress

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Fedosenko, G.P.

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Translation from: Referativnyy zhurnal, Mekhanika, 1960, No. 2, p. 45, # 1889

AUTHORS: Yeremenko, O.S., Fedosenko, G.P.

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TITLE: The Characteristics of Small-Height Turbine Cascades

PERIODICAL: Sb. prats' in-t teploenerg. AN UkrSSR, 1959, No.16, pp. 73 - 76 (Ukr., Russ. summary)

TEXT: Results from experimental investigations of cascades of active turbine blade profiles are presented; the blades had a small relative height $l = 0.815$ and 0.208; the tests were carried out at Mach number $M = 0.2$ and Reynolds number $R = 1.6 \times 10^5$. The following results are obtained: 1) The flow around short blades is three-dimensional over the entire height of the blade. The efficiency distribution over the height of the blade is extremely non-uniform, which may be caused by the closure of secondary flows. The value of efficiency of such cascades is essentially lower than the efficiency of long blade cascades; for cascades with $l = 0.208$, the minimum efficiency is found in the middle of the blade, for cascades with $l = 0.815$ at a distance of 0.25 of the height of the blade edge. 2) The optimum value of the stream incidence angle in cascades with very short blades shifts into the region of higher values in comparison with

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The Characteristics of Small-Height Turbine Cascades

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usual cascades. For example, the increase in stream incidence angle from 19° to 40° in a cascade with $l = 0.208$ led to increase in cascade efficiency from 75% to 81%. 3) The optimum value of spacing in cascades with very short blades $l < 0.3$ shifts into the region of lower values. For example, the increase in relative spacing t from 0.6 to 0.755 led to increasing efficiency of the cascade by 2% in a cascade with $l = 0.208$.

V.Kh. Abiants

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PHASE I BOOK EXPLOITATION SOV/6059

Yeremenko, Aleksandra Semenovna, Ivan Yemel'yanovich Virozub, Yuriy Pavlovich Gorbatyy, Ivan Lazarevich Mironenko, and Anna Petrovna Fedosenko

Metody eksperimental'nogo issledovaniya aerodinamiki osevykh turbomashin (Methods for the Experimental Investigation of the Aerodynamics of Axial Turbomachines). Kiev, Izd-vo AN UkrSSR, 1961. 129 p. 2550 copies printed.

Sponsoring Agency: Akademiya nauk Ukrainskoy SSR. Institut teploenergetiki.

Ed. of Publishing House: N. M. Titova; Tech. Ed.: T. R. Liberman.

PURPOSE: This book is intended for technical personnel of scientific research institutes and plant laboratories concerned with problems of aerodynamic investigations of the components of the turbine flow-passage area.

COVERAGE: The book deals with some problems of the method of aerodynamic investigation of parts of steam and gas turbines, measuring technique, and the

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building of experimental models. It describes various types of instruments for measuring the parameters of two- and three-dimensional flows, methods of making and calibrating these instruments and also the manufacturing technology of model turbine blades. It describes also the most frequently used stands for investigating turbine blade cascades in stationary conditions and in motion. Candidate of Technical Sciences V. I. Pechuk assisted in the preparation of the first draft of the manuscript. The authors thank Ye. P. Dyban for his valuable remarks. There are 41 references: 39 Soviet, 1 English, and 1 French.

TABLE OF CONTENTS:

VIROZUB, I.Ye. [Virozub, I.O.]; GORBATYY, Yu.P. [Horbatyi, IU.P.]; YEREMENKO, A.S. [IEremenko, O.S.]; FEDOSENKO, A.P. [Fedosenko, H.P.]

Some results of the study of a circular lattice. Zbir. prats' Inst. tepl. AN URSR no.24:86-90 '62. (MIRA 16:3)
(Turbines)

VIROZUB, I.Ye. [Virozub, I.O.]; GORBATYY, Yu.P. [Horbatyi, IU.P.]; YEREMENKO, A.S. [IEremenko, O.S.]; FEDOSENKO, A.P. [Fedosenko, H.P.]

Aerodynamic studies of a turbine stage with relatively short blades and variable modes of operation. Zbir. prats' Inst. tepl. AN URSR no.24:91-97 '62. (MIRA 16:3)

(Turbines) (Fluid dynamics)

FEDOSENKO, B.

FEDOSENKO, B.

Growth of the atomic equipment market. Vnesh. torg. 27 no.8:14-18 '57. (MIRA 10:9)

(Atomic power industry)

FEDOSENKO, B.Ye., inzh.

For a further improvement in rug production. Tekst. prom. 18 no. 7:70-71 Jl '58. (MIRA 11:7)

(Rugs)

FEDOSENKO, B.Ye.; KHRAMENKOVA, R.M.

Useful manual for workers engaged in wool manufacture("Arrangement and maintenance of machinery for wool weaving preparatory shops" by M.N.Nikitin. Tekst.prom. 21 no.2:85 Ja '61. (MIRA 14:3)
(Woolen and worsted manufacture—Equipment and supplies)

FEDOSENKO, B.Ye.

Capron harness cords for jacquard looms. Tekst.prom. 21 no.9:47-49 S '61. (MIRA 14:10)

1. Rukovoditel' gruppy tekhnologicheskogo byuro Mosoblsovnarkhoza.
(Looms) (Nylon)

FEDOSENKO, B. Ya.

Developing a continuous production line for the receiving and finishing of rug goods. Tekst. prom. 23 no.3:64-67 Mr '63. (MIRA 16:4)

1. Starshiy inzhener tekhnicheskogo otdela Lyuberetskogo kovrovogo kombinata.

(Assembly-line methods)
(Rug and carpet industry)

FEDOSENKO, Boris Yefimovich; LISINA, Anna Petrovna; KOZYRENKO, Natal'ya Mikhaylovna; ZLOBNOV, Gennadiy Mikhaylovich; AKIMOV, T.S., kand. tekhn. nauk, retsenzent; ISTOMINA, T.I., retsenzent; NIKITIN, M.N., retsenzent; TYURINA, A.Z., red.

[Mechanical looms for rug and carpet weaving] Mekhanicheskie kovrotkatskie stanki. [By] B.E.Fedosenko i dr. Moskva, Izd-vo "Legkaia industriia," 1964. 323 p. (MIRA 17:6)

FEDOSENKO G. P.

S/526/62/000/024/007/013
D234/D308

AUTHORS: Virozub, I.O., Horbatyy, Yu.P., Yeremenko, O.S. and Fedosenko, H.P.

TITLE: Some results of the investigation of a ring grid

SOURCE: Akademiya nauk Ukrayins'koyi RSR. Instytut teploenerhetyky. Zbirnyk prats'. no. 24, 1962. Teploobmin ta hidrodynamika, 86-90

TEXT: The grid was studied in 9 sections along the height of the channel between the blades, with M = 0.5 and 0.8. The distance from the outlet edge plane to the point of measurement was 4.5 and 9 mm. Graphs of the variation of flow parameters, of the velocity coefficient and the stream outlet angle vs. channel height, pressure distribution along the profile (in the sections III, V, VI) and flow charts are given. M = 0.5 has better efficiency than M = 0.8. There are 4 figures.

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FEDOSENKO, G. P.

S/526/62/000/024/008/013
D234/D308

AUTHORS: Virozub, I.O., Horbatyy, Yu.P., Yeremenko, O.S. and Fedosenko, G.P.

TITLE: Aerodynamic investigations of a turbine stage with relatively short blades under varying operating conditions

SOURCE: Akademiya nauk Ukrayins'koyi RSR. Instytut teploenerhetyky. Zbirnyk prats'. no. 24, 1962. Teploobmin ta hidrodynamika, 91-97

TEXT: The ratio of mean diameter to blade length in the working wheel was 10.38. The flow parameters were measured before the first directional device, in the gap between it and the working wheel, and behind the working wheel, in seven sections along the channel heights. The air flow rate was constant for different numbers of revolutions. The full pressure remains nearly constant in the core of the stream and drops sharply near the outlet edge. The velocity of rotation did not affect the efficiency of the direction-

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Aerodynamic investigations ... S/526/62/000/024/008/013
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al grid. The outlet angles decrease with increasing velocity coefficient. Energy losses are greatest near the blade ends. In the channels of the working wheel a considerable part of the working substance flows from the root towards the end, especially when the velocity of rotation increases. The experimental increase of the axial component of velocity is much larger than the calculated one. The rate of flow through different sections of a thin cylindrical layer of the working substance is not constant. There are 9 figures and 1 table.

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